Data Curation 101

ABCs of Data Curation & Scholarly Communication
Science & Engineering Academic Librarians (SEAL-S) Fall Program
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Overview

- Managing data & metadata
- Stakeholders
- Ethics, legality & copyright
- Data management plans
- Library roles
- Challenges

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Data Curation Defined

"Data curation is the active and on-going management of data through its lifecycle of interest and usefulness to scholarly and educational activities."

GSLIS, UIUC: http://cirss.lis.illinois.edu/CollMeta/dcep.html

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Why manage data?

- Essential raw material of science
- Demand for transparency of science
- Funder requirements
- Publisher recommendations

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Data Management

- Activities
  - Enable discovery & retrieval
  - Maintain data quality
  - Preserve & archive for re-use
- Tasks
  - Appraisal & selection
  - Data integrity
  - Interoperability

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What is Data?

- Text (e.g. flat text files, Word, PDF)
- Numerical (e.g. SPSS, STATA, Excel, Acess, MySQL)
- Multimedia (e.g. jpeg, tiff, dicom, mpeg, quicktime)
- Models (e.g. 3D, statistical)
- Software (e.g. Java, C)
- Domain-specific (e.g. FITS in astronomy, CIF in chemistry)
- Instrument-specific (e.g. Olympus Confocal Microscope Data Format)

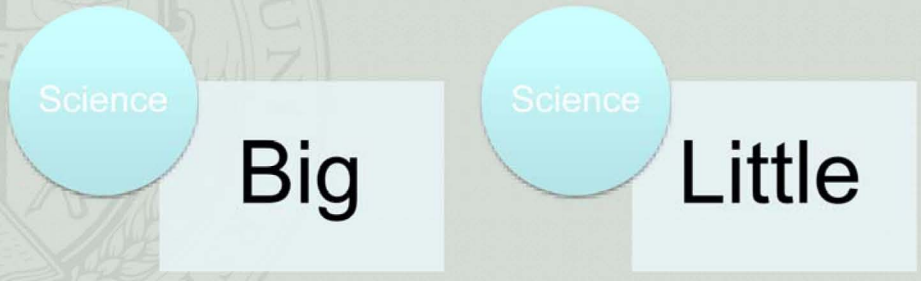
Size of Data Sets

Relevant References

•"Big Science" was originally coined by Alvin M. Weinberg in his 1961 work Impact of Large-Scale Science on the United States, *Science* 134 (3473): 161-164.

•De Solla Price, D.J. (1963). *Little Science, Big Science.* New York, NY: Columbia University Press.

Note: "Little Science" is now referred to as "Small Science".



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Data Storage Options

- Local
- Campus/Funder/Discipline-based
- Cloud-based

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Metadata

- Descriptive information
- Created for the purpose of retrieval & reuse
  - During creation of data
  - During archiving
- Standards
  - Data interoperability
  - Repository

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Metadata Standards

- Example Standards
  - Darwin Core (for biology data)
  - Data Documentation Initiative (DDI)
  - Directory Interchange Format
  - ISO 19115:2003
  - PREMIS
  - Science Data Literacy (SDL)
  - Seeing Standards (http://www.dlib.indiana.edu/~jenlrile/metadatamap/seeingstandards_glossary_pamphlet.pdf)

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Metadata Quality Issues In Repositories

Examples Include:

- Missing critical fields
- Insufficient information
- Inconsistent field values & defined standards
- Fields with: Not available, n/a, none, & nbsp (space), wrong year, etc.
- Broken links
- Outdated contact information
- Challenges with updating
- etc.

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Digital Data Roles & Stakeholders

- Data Authors
- Data Scientists
- Data Managers
- Digital Curators
- Data Users
- Journal Publishers

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Different User Communities

- Observational users
- Infrastructure users
- Modelers
- Students
- Scientists
- Policy makers
- General public
- etc.

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Ethics, Legality & Copyright

- Data privacy, confidentiality, etc.
- Data disclosure
- Data ownership based on university & granting agency policies
- Data citation in development
  - MIT Libraries
  - Purdue's Online Writing Lab
  - APA Publication Manual, 6th edition
  - Dataverse Network Project

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Funder Requirements & Data Management Plans

- Data Plans Include:
  - The types of data to be produced
  - The standards that would be applied for format, metadata content, etc.
  - Provisions for archiving & preservation
  - Access policies & provisions
  - Plans for eventual transition or termination of the data collection after funding period
- Resources:
  - SHERPA – JULIET
  - UMN Funding Agencies & Data Management Guidelines
  - Digital Curation Centre Data Management Tool
  - NSF

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Data Plan Development

- What form and format is the data in?
- What is the expected lifespan of the dataset?
- How could the data be used, reused, and repurposed?
- How large is the dataset, and what is its rate of growth?
- Who are the potential audiences for the data?
- Who owns the data?
- Does the dataset include sensitive information?
- What publications or discoveries have resulted from the data?
- How should the data be made accessible?

From Purdue University Libraries, Conducting a Data Interview by Michael Witt and Jake Carlson

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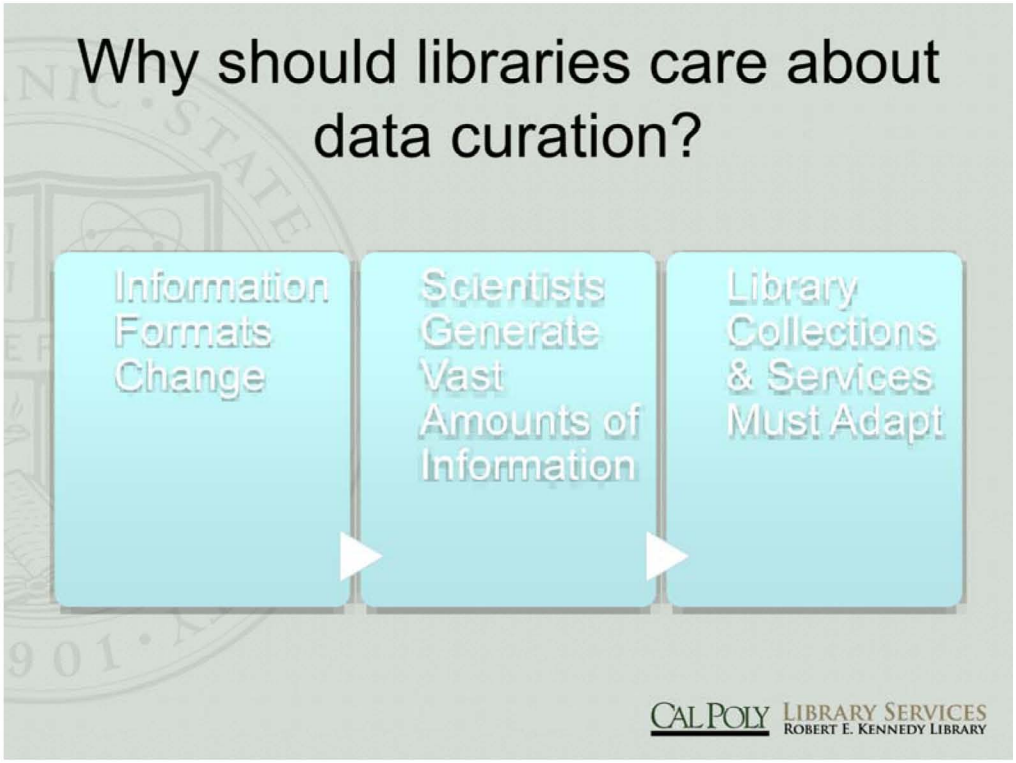
Why should libraries care about data curation?
Information Formats Change
Scientists Generate Vast Amounts of Information
Library Collections & Services Must Adapt
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What knowledge do librarians bring to the table?

- LIS & archival theory
- Collection development, discovery, etc.
- LIS & IT partnerships
- Data management & scholarly communications
- Data organization

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Library Roles

- Self-education
- Outreach to scientists
- Provide new services –
  - Research,
  - Resources (repositories & databases)
  - Reference
- Collaborate with campus stakeholders

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Data Management Education

- Why Manage Your Data?
- Managing Data
- Back-up Practices
- Ethics, Legality & Copyright
- Funder Requirements & Data Plans
- Science Data & Repositories

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Managing Data Basics for Data Creators

1. Ensure data is accessible for the long-term, save a copy of data in a non-proprietary, commonly-accessible formats.
2. Keep a records of how data is produced & store it in a text file in the same directory as the data.
3. Use a folder/directory structure with a clear, documented naming scheme.
4. Use naming conventions for files
5. Lots of Copies Keeps Stuff Safe! Keep 3 copies of data in geographically distributed locations.

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Data & Libraries

Data & Libraries Overview 2006-2010

Gold, A. (2010) Data Curation and Libraries: Short-Term Developments, Long-Term Prospects Available. Earth and Space Science Informatics: Strategies for Improved Marine and Synergistic Data Access and Interoperability Session, 2009 American Geophysical Union (AGU) Fall Meeting, 14–18 December, San Francisco, CA.

Available online at:
http://digitalcommons.calpoly.edu/lib_dean/27

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Current Challenges in Curation

- Theory, policy, application, practice
- Relationships, data, practices, curation activities
- Emerging models, new divisions of labor and new roles
- Conceptualizing collections, observations, datasets, etc.
- Lifecycles ,selection and appraisal
- Continuity of access to usable and useful data, sustainable service models
- Resource allocation, limited infrastructure

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Questions?

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Data Curation Management Guide
http://libguides.calpoly.edu/data

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